

The Kyoto Protocol and the Private Forest Policy of Local Governments in Japan

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Abstract National government policies on preventing global warming are becoming increasingly important in Japan, especially since the Kyoto Protocol became effective in 2005, and the first commitment period began in 2008. The Forestry Agency has combined policies promoting domestic forestry with those to prevent global warming and has developed a 10-year action plan. However, the forest resource database and related statistics represent serious problems in the forest management system in Japan and in the administrative work of the prefectural governments that manage the database. The database contains much incorrect data, which is difficult to correct because of insufficient budget and staff. The budget problem has seriously affected the entire administrative section of the Forestry Agency since the 1990s. Environmental taxes related to forests have recently been introduced in many prefectures, although the total revenue generated is small. The basic problem with the database is that the National Land Survey is incomplete and, consequently, the forest land size information in the database is unreliable. Furthermore, because prefectural governments are not required to report statistics on timber harvests, the cutting volume in each municipality is uncertain. Considering this situation, it may be difficult for the private forest sector to contribute greatly to the Kyoto Protocol without changes in the forest management system by both national and prefectural governments.

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Introduction

In accordance with the Kyoto Protocol, which became effective in February 2005, Japan must cut 6% of total greenhouse gases from the 1990 levels during the first commitment period from 2008 to 2012. The national government established the Kyoto Protocol Target Achievement Plan in April 2005, with planned greenhouse gas reductions as outlined in Table 1. Under the plan, carbon absorption by the domestic forest sector is expected to reach 3.9% of the total greenhouse gas emissions of 1990. This level was accepted officially by the Seventh Conference of the Parties to the United Nations Framework Convention on Climate Change (COP7) in 2001. However, the plan also points out a serious situation in the domestic forest sector: when the carbon absorption by forests is calculated—under the conditions of current forest practices, log production and lumber utilization—the result is far below 3.9%.

In August 2007, the government submitted its ‘Report on Japan’s Assigned Amount Pursuant to Article 3, Paragraphs 7 and 8 of the Kyoto Protocol’ to the United Nations Framework Convention on Climate Change. In the report, the government calculated total greenhouse gas emissions in the base year of the Kyoto Protocol to be 1,261 million tons (Mt) in CO₂ equivalents, which was revised upward from the 1,237 Mt reported in the Kyoto Protocol Target Achievement Plan (2005). However, the maximum forest absorption of CO₂ is calculated at 13 million C-tons (approximately 48 Mt CO₂ equivalent). Thus, the projected rate of carbon sink by forests is currently 3.8%.

The Kyoto Protocol Target Achievement Plan was completely revised in March 2008, per Article 9 of the *Law Concerning the Promotion of the Measures to Cope with Global Warming of 1998*. The revised plan addresses the difficulties of reaching the final target of a 6% CO₂ reduction under current policy measures, but

Table 1 Targets for greenhouse gas reduction and absorption (Mt CO₂ and percentage)

GHG emissions	GHG reduction	Emissions in financial year 2010	Change rate compared to financial year 1999
Energy related CO ₂		1,056	0.6
CO ₂ from non-energy sources		70	−0.3
Methane		20	−0.4
N ₂ O		34	−0.5
Other GHGs		51	0.1
	Sink including forests	−48	−3.9
	Kyoto mechanism	−20	−1.6
Total		1,163	−6.0

Source: The Kyoto Protocol Target Achievement Plan (2005)

indicates that the additional measures in the revised plan are expected to make the 6% reduction possible. Based on a preliminary calculation for fiscal year 2005, the total absorption of CO₂ by forests was 9.66 million C-tons, which is equivalent to 2.8% of total base-year greenhouse gas (GHG) emissions in 1990 (Forestry Agency 2008a). It is a national policy matter to increase the desired forest management area under Article 3.4 of the Kyoto Protocol.

Japanese forest land is divided into national forest, public forest, and private forest classified by ownership. National forest land is managed by the Forestry Agency of the Ministry of Agriculture, Forestry and Fisheries (MAFF), and public forest land is managed by local governments. Recently, both national and local governments developed various action plans on global warming, including policy measures for national and public forests managed directly by both national and local governments, respectively. When a sufficient level of budgeting and management organization exists, both categories of forests have the possibility to realize the Target Achievement Plan. In this sense, the forest category that has the greatest difficulty in achieving the proposed plan is the private forest, which is composed of a large number of forest owners, most of whom are small-scale and non-active owners.

This paper briefly describes Japan's action plan addressing the global warming problem in the field of forestry. Recent prefectural government policies on global warming relating to private forests, especially from the perspective of statistics administration, are also explained. The forest resource data management system and the related statistics system are important to understanding the real forest management situation systematically. The current systems have several serious deficiencies to overcome. This paper discusses limitations of the forest resource database, problems with forestry statistics, and new developments in forest resource data management. In addition, financial aspects (e.g. budgets and taxes) of the Kyoto Protocol and forestry and the forestry statistical system are discussed in relation to the current deficiencies, and the role of local governments is addressed.

The Global Warming Problem and Forest Policy

In December 2002, the MAFF adopted a 10-year Action Plan of carbon dioxide absorption by forests for the reduction of GHGs. This action plan shows the basic policy direction of the ministry concerning global warming problems. The targets of the action plan are: (1) correct forest management to maintain healthy forests; (2) promotion of sustainable management for the conservation of protection forests¹; (3) promotion of the use of timber and wood biomass; and (4) promotion of forestation through public awareness and citizen participation.

¹ Japan has both 'protection' and 'protected' forests, and the similarity of the names can be confusing. The *Forest Law* designates protection forests for public purposes, such as headwater conservation and disaster prevention. Both national and private forests can be classified as protection forests. On the other hand, a protected forest is a category only within the national forest system and is mainly designated for ecosystem preservation qualities. In principle, a protected forest is to be preserved without any human intervention.

There are approximately 10 M ha of plantation forests in Japan. Many of these plantation forest areas were planted in the 1960s and 1970s using subsidies from national and local governments. The main trees planted were Japanese cedar (*Cryptomeria japonica*) and Japanese cypress (*Chamaecyparis obtusa*). There are many plantation forests in which management was too limited and could not provide for thinning of trees or repair of damage caused by animals, diseases and typhoons. One of the most important forest policies is the promotion of thinning of plantation forests. The basic forest resource policy after World War II was to increase domestic forest resources, and the 10 M ha of plantation forest are the result. The policy change from such a quantitative goal to a qualitative one, such as sustainable forest management, became clear in the 1996 Basic Forest Resource Plan, which specifies the Japanese forest planning system. Because the concern for quality aspects of forest resources has just begun, the important initial target (Target 1) is difficult to achieve.

Target 2 relates to protection forests and similar forest areas controlled by law. The protection forests specified by the *Forest Law* of 1951 cover 47% of the total forest area in Japan (as of March 2008). The policy direction for protection forests after World War II was also to increase the specified areas, as promoted through the Protection Forests Consolidation Plan, which was revised every 10 years. Under the first plan (1954–1963), the specified area of protection forests mainly relating to disaster prevention increased. Under the second plan (1964–1973), an increase in the specified area of headwater-conservation forests was planned to support the increasing demand for water at that time. Under the third plan (1974–1983), the specified area of recreation forest increased. Through five plans, the area of forest specified as protection forests increased from 2.5 M ha in 1953 to 9.8 M ha in 2003.

The protection forest system started under the first *Forest Law* in 1897. Before World War II, protection forests were confined to a relatively small area, most of which was not allowed to be cut or only allowed to be cut selectively. However, the characteristics of forest area specified as protection forests after World War II also changed under the policy to increase specified areas. In many parts of protection forests such as headwater-conservation forests, clear-cutting is permitted with some upper size limits. After the expansion of specified areas, management has grown in importance. After the fourth plan (1984–1993), a new category was added to the protection forests, namely specific protection forests, for the forests where the expected function has been lost or weakened by various factors, including insect attack and typhoons. The 10-year plan system completed its fifth cycle (from 1994 to 2003), and the law, which gives authority for the national government to make 10-year plans, ended on 31 March 2004.

Target 3 relates to timber and wood biomass. To reach the final goal of the 10-year Action Plan, a sustainable social system as well as a recycling-oriented society is necessary. As for forest resources, the effective utilization of timber and forest biomass is expected. The total timber demand in Japan increased to approximately 120 M m³ in 1973 and then slowly decreased to 87 M m³ in 2003. Generally, the utilization of biomass resources has been delayed in Japan. Recently,

the facilities using wood biomass resources have increased throughout Japan as a result of government subsidies.²

Target 4, which relates to people, is probably the most important basic target. For example, government subsidies may in the short-term contribute to changes or improvements in forest management (Targets 1 and 2) and to an increase in consumption of forest products including wood biomass (Target 3), but the way individuals think probably will not change. Target 4 provides a longer-term approach. Some examples of actions include tree-planting events, sustainable volunteer activities, and environmental education.

These targets include broad social and economic aspects; therefore, the plan must be developed for both national forest and non-national forest land (public and private forest). Cooperation between mountainous areas and city areas, involving national government, local government, companies and the public, is necessary.

The action plan includes concrete measures to realize these four targets. As a fifth measure, a system for examining and reporting carbon dioxide absorption by forests is set forth in the action plan. After the Kyoto Protocol went into effect, the national government planned to count the maximum level of carbon dioxide absorption by forests to meet the Protocol target. To reach this goal, the information system related to forest resources must be strengthened or reorganized, especially since the first commitment period from 2008 to 2012 has already begun.

The Forest Resource Data Management System of Prefectural Governments

The system of forest resource information is managed mainly by prefectural governments, and the private forest resource database is managed as part of the forest planning system, as illustrated in Fig. 1. According to the *Basic Forest and Forestry Law* of 2001³, the national government must develop a Basic Forest and Forestry Plan. This basic plan, which is generally revised every five years, requires the national government to formulate a National Forest Plan. For non-national forests, each prefectural government is required to develop a Regional Forest Plan, for which the planning area is determined mainly by the river systems, but also by the location of local offices of prefectural governments and the size of planning areas. For national forest, the Regional Forestry Offices must develop Regional Forest Plans for the same planning area as that of prefectural governments. The local planning system of national forests is not discussed in this paper. Under a Regional Forest Plan, municipal offices must make Municipal Forest Plans, in which the planning areas are defined by the boundaries of the municipalities. The municipal governments also have the rights to accept Forest Practice Plans made by forest owners, and to permit forest practices, including cutting.

² A law to promote the use of biomass energy from agriculture, forestry and fisheries came into effect on 1 October 2008

³ The *Basic Forestry Law* was introduced in 1964 for the purpose of increasing timber production, timber productivity and income of forest workers. This law was fully revised in 2001, and the title of the law was changed to the *Basic Forest and Forestry Law*.

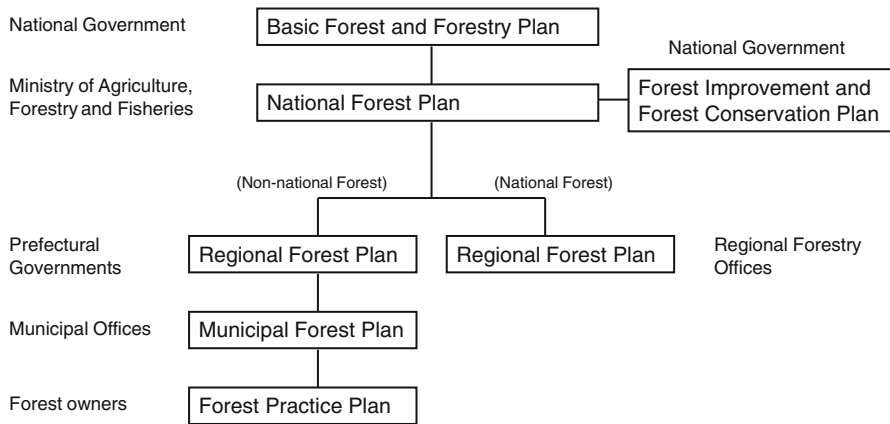


Fig. 1 The forest planning system in Japan. *Note:* In case of National Forest, the lower level plans are not shown

The data for the Regional Forest Plan of non-national forest land are maintained by the forestry departments of prefectural governments, and the national government determines the basic data format. The national government gathers the summary tables prepared by prefectural governments, and municipal offices use data obtained from prefectural governments. Thus, the Forest Resource Database from prefectural governments, called *Shinrinbo*, is highly important to both national government and municipal offices. This database includes all non-national forests, including private and public forests; here, only the former are discussed.

Almost all of the data relating to forest resource management are included in the prefectural database, including administration area, location, name of forest owner, species, ratio of coniferous to broadleaved forest, forest area, current standing volume, volume at cutting age, crown density, site quality, cutting method, and existence or non-existence of forest practice plan. Thus, when the database is well maintained, national and local governments can obtain a clear picture of how well the private forests are operating. To gain the maximum contribution from forest management under the Kyoto Protocol, the national government must have a reliable and easily understood data management system. Real-time forest management data—such as cutting volume, planting area and damaged forest area—must follow a consistent recording system and be easily understood. For these reasons, the data must be completely connected to a map.

Limitations of the Forest Resource Database

The current Forest Resource Database managed by prefectural governments has some serious limitations (Matsushita and Yoshida 1998). The basic items related to forest owners and the size of forest land include many incorrect entries. For example, the names of owners are often not changed, when in fact ownership has changed. Another combination of maps and data on forest land is available in Japan,

namely the Land Register, which includes all land uses. However, these data do not include information on forest resources such as species and volume.

A further problem is that because the areas within the Forest Resource Database generally are not based on surveys, many of them are inaccurate.⁴ The basic reason for this problem is that the National Land Survey initiated in 1951 is still incomplete (about 45% complete in 2002 according to Samejima 2004). In some prefectures, the percentages of completion are very low, including in Osaka Prefecture (3%), Mie Prefecture and Kyoto Prefecture (6%), Gifu Prefecture (8%), and Nara Prefecture (9%). In the forest area, approximately 120,000 km², or almost one-third of Japan's total land area, remains unsurveyed. Thus in most cases the area reported in the Forest Resource Database is a broad estimate.

Many of the data in the Land Register are not from actual surveys. The area of forest owned by owners who do not live locally has increased to 25% according to the 2000 Census of Agriculture and Forestry. The percentage in some individual prefectures is much larger (e.g. 53% in Hokkaido Prefecture). There is concern that the National Land Survey in mountainous areas will become increasingly difficult to conduct in the future. Further, the remaining forest owners are aging, and some of them as well as their successors do not know the exact boundaries of their forest land. It is a serious limitation that the most basic data such as the name of the forest owner and the size of the forest are unclear. Recently, the Geographic Information System (GIS) approach has been adopted for forest resource management by prefectural governments and forest owner associations, although the GIS data are still generally incorrect. The National Land Survey is indispensable for reliable GIS applications in forests (Yamamoto and Hagiwara 2003; Yamamoto 2004).

The Forest Resource Database also contains many errors with respect to species and age. This database was initiated after World War II, and the annual survey for the database was conducted by the staff of the forestry departments of prefectural governments until the 1970s in most prefectures. Until recently, the database was maintained mainly on prefectural government computer systems. The introduction of a computer system for forest planning resulted in a reduction in the number of forestry staff. The data were processed by non-forestry computer workers without field knowledge, and there was a lack of on-site checks.

A further problem is that harvest reports⁵ submitted by forest owners, mandated under the *Forest Law*, are often inaccurate. A 1995 survey of 184 forest owners in Kagoshima Prefecture identified reasons for failure to submit a harvest report: 42.4% of respondents indicated that 'as the cutting area was small, I thought a harvest report was not required,' and 32.1% agreed that 'I did not know of the existence of a harvest reporting system' (Matsushita 1996). While compliance may have increased since 1995, some owners still do not understand the administrative

⁴ Forest land areas with subsidized trees are always correctly surveyed because surveying is a requirement to obtain subsidies.

⁵ A harvest report must be submitted to the municipal office when a forest owner plans to cut trees, including trees that are not for sale. Article 10(8) of the *Forest Law* stipulates that the report must include location, area, age of trees to be cut, and cutting method, as well as plans for forest land management after cutting.

system related to forestry practices, suggesting a problem for local governments regarding publicizing forest policies.

In the 1998 *Forest Law* amendment, the authority to accept the harvest report was transferred from prefectural governments to municipal offices, which are the administrative offices closest to forest owners. Forest owner associations have played an important role maintaining the Forest Resource Database on behalf of forest owners and prefectural governments. The association was initially founded for the territory of the municipal offices during World War II, and one of the main roles of the association was to perform work complementary to the municipal offices. Generally in Japan, the forestry section is undeveloped in municipal offices, and one of the reasons is the existence of forest owner associations that have a jurisdiction area equal to the municipal one. Recently, the forest owner associations have weakened, and the Forestry Agency has encouraged the amalgamation of small associations. Both the weakening and amalgamation have led to errors in the Forest Resource Database because of the diminished relationship between forest owners and associations.

A third issue concerns the yield tables included in the computer system of prefectural governments. Yoshida and Matsushita (1999) pointed out that the yield tables used in prefectural governments, which were estimated mainly during the 1960s and 1970s, vary widely among prefectures. As the yield tables are regional to account for differences in geographical conditions, differences of yield tables between prefectures may not be a serious issue. However, these differences appear to be largely the result of differences in the estimation methods and data used. Even if the current area, species, age, and site conditions are accurately recorded by prefectural governments, the standing volume and growth volume predicted by yield tables may be incorrect. In some yield tables, the prefectural governments do not own the original data that were used to estimate the table. It would be desirable for the yield tables and the calculation process to be available outside the forestry sector, e.g. in foreign countries involved in the Kyoto Protocol.

Problems with Forestry Statistics

The most important statistics on forestry and forest resources on a national level are generated by the Census of Agriculture and Forestry (Designated Statistics, No. 26, specified in 1949), which is conducted every 10 years. The most recent census contains results for the year 2000. The forest resource tables of the Census of Agriculture and Forestry were made from summary tables prepared by prefectural governments, which were calculated from the Forest Resource Database. Therefore, to improve the precision of the national statistics, the Forest Resource Database must be improved first. However, while most of the statistical data are based on surveys of forest owners, the percentage of forest owners who do not live near their forest has increased in recent surveys. Under such conditions, the conventional survey system of the Census of Agriculture and Forestry may fail.

The annual stock change in volume is calculated by subtracting the decreasing volume caused by various types of damage and by cutting activities from the growing volume. However, there is no system for calculating the annual cutting

volume (Matsushita 2003). Another statistical information source pertaining to forestry on the national level is the Survey of Lumber Products (Designated Statistics, No. 69, specified in 1953). This survey includes several annual figures on wood-based industries. The arrival volume to mills can be thought of as a figure representing the log volume moving out of forests because almost all trees cut down domestically are processed in domestic sawmills. Prefectural governments estimate the annual cutting volume using data from the Survey of Lumber Products, the harvest report, local log auction markets, and information on forestry subsidies. It must be noted that this calculation procedure is not available to individuals outside the department such as forest owners, forestry company members and researchers. Some of the data from the Survey of Lumber Products are available only at the prefectural level. With such constraints, prefectural governments estimate the annual cutting volume at the municipal level as well. From the perspective of consistency in regional forestry statistics, use of the Survey of Lumber Products seems to be a feasible approach; however, this method is weak given that the cutting volume does not correspond to the actual area subject to cutting.

These two national level statistics were specified as Designated Statistics by the Statistics Bureau, Ministry of Internal Affairs and Communications. The actual survey of these two statistics is conducted by the Statistics and Information Center, Regional Agricultural Administration Offices, MAFF. This center was founded at the prefectural level. However, the national government is now facing financial difficulties, and administrative reform has been planned. In December 2004, the Cabinet established the Future Policy on Administrative Reform. Among the policies, a significant cut in the number of staff and structural changes in regional offices were proposed in the field of agriculture, forestry and fisheries statistics. Some survey currently conducted by the Statistics and Information Center staff will not be conducted in the near future. As prefectural governments face serious financial situations similar to that of the national government, additionally needed forestry surveys at the prefectural level may fail to be conducted.

Another problem pertains to the protection of personal data. In April 2005, the *Act concerning the Protection of Personal Information* (Law No. 57, 2003) came into effect. Both the Census of Agriculture and Forestry and the Survey of Lumber Products face problems related to the protection of personal data. The Forest Resource Database also faces this difficulty (Matsushita and Yoshida 2002) because the *Act concerning the Protection of Personal Information* includes personal information used by local governments.

There are many damaged forests throughout Japan. Statistics on specific types of damage have been reported by the Forestry Agency (2008b). For example, in 2004, 2005, and 2006, 1,568, 1,116, and 829 ha of forest burned, respectively. For non-national forest land, meteorological disasters including wind, flood and snow damaged total areas of 48,144, 2,516, and 17,565 ha. The most serious forest damage by disease and insects was from pine wilt disease (affecting 644,000 m³ in fiscal year 2006). The greatest damage from animals was caused by deer, totaling 3,000 ha in 2006. Except for the almost complete disappearance of forest, for example by fire, damage in part of the forest occurs naturally. Therefore, reflecting damage within the Forest Resource Database is difficult. In addition, in many cases,

the same forest suffers the same damage repeatedly, e.g. damage by deer. It is difficult to assess damage every year in the database. In the case of damage by animals, the statistics gathered by prefectural governments were not connected to the forest location maps in general, so the damage may have been counted two or even more times in some cases.

Under the Kyoto Protocol, the location of forest areas that is well-managed, cut or damaged must be clarified systematically for all of Japan during the specified periods. To maintain mutual consistency among forestry statistics, several basic data variables must be strictly connected to each other. However, many statistics are generated separately by different sections of the same ministry or the same prefectural government and do not have mutual consistency. One of the common problems in forestry statistics is the lack of a relationship between data and location.

New Developments in Forest Resource Data Management

There are several recent alterations to the Forest Resource Database managed by prefectural governments. In the 1998 amendment of the *Forest Law*, the role of municipal offices in non-national forest policy increased, and it was established that the Municipal Forest Plan must be responsible for all forest practices. Hence, development of forest databases at the municipal level is required to conduct forestry administration.

Given that the National Land Survey has generally been incomplete, the basic maps used in the GIS forest resource management system contain many errors. None of the prefectures has completed the survey, although some municipal offices have completed it. For these municipal offices, accurate forest map data are available for the GIS forestry system. For example, in the case of Yusu-hara, Kochi Prefecture, with a total area of 23.7 km², the National Land Survey began in 1962 and was completed in 1983. In 1993, the forestry information system, including map data, was developed based on results from the National Land Survey. This forestry information system contributed to the forest certification of Yusu-hara by the Forest Stewardship Council in 2000 (Samejima 2004). Results of the National Land Survey require continuous updating for changes in land use, at a cost to municipal offices.

Strengthening of the Forest Resource Databases by forest owner associations has been observed. For example, in the case of the Hiyoshi-cho Forest Owner Association, Kyoto Prefecture, forest thinning has recently been strongly encouraged. The association introduced a new forest information management system to replace the Forest Resource Database managed by the prefectural government and used by most forest owner associations. It is notable that the importance of the correct database was understood by the manager of the association.

The main target of the forestry departments of prefectural governments for the promotion of private forestry has conventionally been forest owner associations. Recently, some prefectural governments have begun to pay attention to private enterprises. Under the circumstance that the national government promotes global warming prevention policies, enterprises can play important roles. One contribution to global warming policy by private enterprises is attendance to and payment for forestry activities. For example, Osaka Prefecture introduced an 'adoption system'

whereby private enterprises may care for currently unmanaged forests. The first company to participate in this program was an electronics company in February 2006. Kochi Prefecture has also launched a new cooperative project between the prefectural government and enterprises concerned about environmental issues, with the first project commencing in May 2006. The enterprises hope to highlight their forestry activities and environmental contributions in corporate social responsibility reports. Thus, accurate data are required regarding their contribution. Improvement of the Forest Resource Database is also required for promoting partnerships among enterprises, prefectural governments and private forest owners.

Discussion

Financial Aspects of the Kyoto Protocol and Forestry

Forestry Agency (2007) data indicate that despite the increase in forest growing stock in Japan, harvesting activity has stagnated. The total forest area and volume were 25.1 M ha and 4,040 M m³, respectively in March 2002 (the most recent survey), with the total harvesting volume falling to 20.8 M m³ in 2004. The self-sufficiency rate of industrial round wood was 18.4% in 2004. The stumpage price has decreased sharply; for example, the price index for Japanese cedar and cypress were 16.0 and 27.9, respectively, in 2005, compared to 100 in 1980. With falling forest profitability, the number of forest owners who have ceased forest management activities has increased. Forest thinning, which is necessary for some age classes of plantation forests planted after World War II, is insufficient or totally lacking.

For the Forestry Agency and the forestry departments of prefectural governments, national policies concerning the Kyoto Protocol may serve as important policy programs for activating the domestic forestry sector. The Kyoto Protocol has thus become a reason for maintaining or increasing the forestry budget and improving silviculture.

On a national level, the issue of government loans has been increasing, and the total budget of the Forestry Agency has decreased in recent years. Figure 2 shows the budget (excluding public works projects) of the Forestry Agency from 1994 to 2006, according to three account categories.

After World War II, the National Forest has been managed under the special accounting system. However, the management situation of the National Forest worsened, and a long-term debt began in 1976, reaching 3,800 billion yen (\$US 23.3 billion) in 1998, when organizational reform occurred. The financial situation has also worsened for forestry corporations managed by prefectural governments, with total long-term debt of all corporations exceeding 1,200 billion yen (\$US 10 billion) in 2005. Given these debt situations, the policy programs for the Kyoto Protocol became a strong argument by forestry administration sectors for budget increases.

Although the Forestry Agency budget (except for public works projects) has been cut, the percentage of budget transferred into the special account for National Forest management has been increased. The budget transfer increased with reform in the

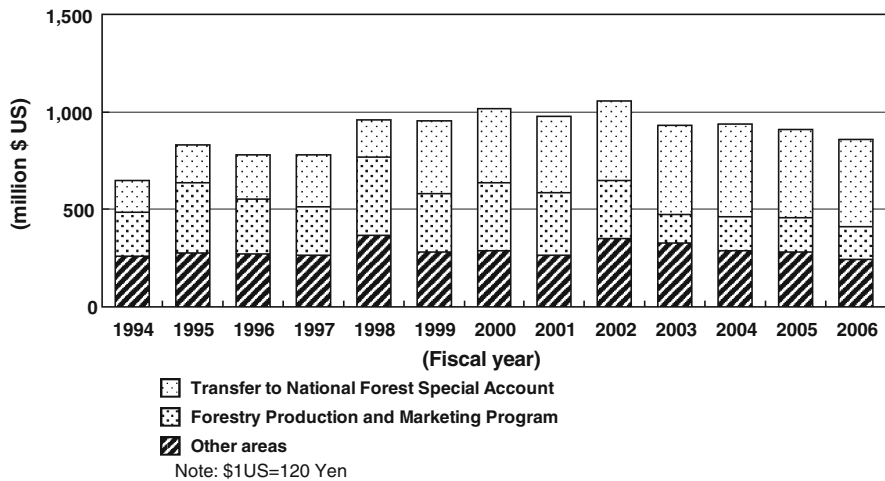


Fig. 2 Contents of the Forestry Agency budget. *Source:* Forestry Agency, Shinrin-ringyo tokei yoran. *Note:* In the Forestry Production and Marketing Program, the classification of expense items by the Forestry Agency changed twice during the period 1994–2005; thus, expense items in this category are different for each of the following periods. Until 1998, expenditures were broken down into the following classes: Forestry Structure Improvement Projects; Forest Production and Marketing Projects; and Watershed Thinning Promotion Projects. From 1999 until 2004, expenditures were shown only as a total for the entire category. Since 2005, expenditure has been the total of two categories: Forest Improvement Projects and Forestry and Wood Based Industry Promotion Projects

organization of the National Forest in 1998 and reached 52.1% of total expenditure excluding public works in 2006. As a result, the expenditure for forestry production and marketing programs decreased. The main expenditures of the Forestry Agency were public works and the transfer to the National Forest Special Account. When policy actions for global warming prevention gained priority, the budget for the private forestry sector decreased.⁶ The Kyoto Protocol Target Achievement Plan was drafted in April 2005. However, the national government had already developed the Outline of Promotion to Prevent Global Warming in June 1998, and a 10-year Action Plan for forestry aimed at the prevention of global warming was published in December 2002. At the time, unfortunately, such policies did not greatly influence the budget of the Forestry Agency.⁷

In addition to the budget system, the tax system is important for the national and prefectural governments to promote environmental actions for the Kyoto Protocol. The draft of the Environmental Tax on a national level made by the Ministry of the Environment in 2005, in which taxation was 2,400 yen (\$US 20) per tonne CO₂, was

⁶ The total expenditure for the private forestry sector has been decreasing since the second half of the 1990s (Ishizaki 2010). This trend can be found at the national, prefectural and municipal levels.

⁷ The 2008 revision of the Kyoto Protocol Target Achievement Plan strongly promotes thinning to increase well-managed forest areas, and the revised plan aims for 200,000 ha of additional thinning per year from fiscal year 2007–2012. The *Special Measures Law for the Purpose of Promoting Thinning and Other Forest Practices* came into effect in May 2008. More funding is expected to be allocated for forestry based on this new law.

Table 2 Regional environmental tax related to forest management

Prefecture	Individual (\$US)	Company (\$US)	Introduction	Taxable period
Kochi prefecture	4.2	4.2	1 April 2003	5 years
Okayama prefecture	4.2	8.3–333.3	1 April 2004	5 years
Tottori prefecture	2.5	5–200	1 April 2005	3 years
Kagoshima prefecture	4.2	8.3–333.3	1 April 2005	5 years

Source: Shiga Prefecture (2004)

Note: The amount is on a yearly basis. The amount is the converted value when \$US 1 = 120 yen. New tax is added to the prefectural residents' taxes on a per capita basis

not passed. At the national level, several new taxes⁸ related to forest, but not to global warming policy, were not passed in the 1980s (Banba 2004).

With budgets relating to forestry at the national and prefectural levels restrained and a national environmental tax not yet realized, it is notable that some environmental taxes have recently been introduced at the prefectural level.⁹ By December 2004, 38 of 47 prefectures had investigated or decided to introduce an environmental tax related to forest or water resources (Akiyama 2005), and 29 had introduced taxes by FY 2008 (Forestry Agency 2009). Four early examples of the regional tax, relating especially to forest, are shown in Table 2. These new taxes are added to the prefectural residents' taxes on a per capita basis. The amount of tax per individual is low, from 300 yen (\$US 2.5) to 500 yen (\$US 4.2) per year.

The four prefectures listed in Table 2 planned to use the revenue from the regional tax for a specific fund. Projects that have been introduced include (1) thinning (especially thinning over 40% to obtain mixed forest); (2) promotion and maintenance of healthy forests; (3) public information, awareness, environmental education, school-owned educational forests and forest volunteers; (4) promotion of wood utilization; and (5) forest management for water conservation or global warming prevention. In the case of Kagoshima Prefecture, global warming prevention is included explicitly in fields using the revenue. All five of these project areas are related to the targets of the 10-year Action Plan. Given the small total revenue from the tax—about 86–450 M yen or \$US 0.7–3.8 M per year—this funding will make little contribution to the 10-year Action Plan of prefectural governments. However, the regional environmental tax may build increased interest in and understanding of forest issues among local residents, which could lead to forest improvements in the long run. For example, the 10-year Action Plan on carbon dioxide absorption by forests for reduction of GHGs includes promoting the

⁸ The Forestry Agency tried to introduce a new tax on water source forests in the fiscal 1986 tax system revision. The River Bureau of the Ministry of Construction tried to introduce system improvement with a water charge in 1985. The MAFF and Ministry of Construction tried to introduce a new tax on water, from which income would be used for forest improvements and river development projects in the fiscal 1987 tax system revision. All of these tax revision plans failed to pass (Banba 2004).

⁹ Reasons for introducing a regional environmental tax include the deterioration of local government finances and the promotion of decentralization policies under the *Omnibus Decentralization Act of 2000* (Fujita 2008).

use of timber and wood biomass. Without understanding by residents, their use could not become widespread and will be largely limited to the public sector.¹⁰

It must be noted that basic policies such as making a Forest Resource Database or conducting the National Land Survey were not included explicitly in the allocation of the regional environmental tax. As the global environmental policies are new to prefectural governments, it is important to raise funds. In Japan, the need to prevent global warming has created public awareness of many forestry issues, and the administrative sector related to forestry has linked these two problems. However, without securing funds, the combination of forestry issues and global warming prevention policies will not result in the expansion of well-managed, healthy forests.

The Forestry Statistical System

It is the national government's duty to generate statistics on a national level, and in the case of forestry statistics, the basic data are part of the forest planning system. The prefectural governments are required to manage the Forest Resource Database to make a Regional Forest Plan as specified by the *Forest Law*. Because the national government prescribes only the basic items that must be included in the database, prefectural governments are responsible for designing and maintaining a database that more closely represents the real state of forests. There are three essential problems with the current database: (1) a lack of recognition of the importance of the National Land Survey, (2) a lack of recognition as to why prefectural governments are currently managing the Forest Resource Database that includes private properties, and (3) insufficient use of forest resource statistics outside the forestry sector.

With regard to the first point, the lack of budget is a major reason why the National Land Survey is often not completed by many local governments. However, another factor is the lack of recognition of its importance. The National Land Survey is conducted mainly by municipal offices under the *Act of National Land Survey of 1951*. As a result, the percentage of enforcement differs by municipal office. Considering the development of land management systems using GIS and the continuing depopulation in mountainous areas, the role of surveyed and computerized maps has increased. Given this situation, it is expected that prefectural governments will lead municipal offices in conducting the National Land Survey, and municipal offices must explain the significance of the survey to land owners. Reform of the Forest Resource Database will be possible only with the success of the National Land Survey.

The second point relates to the work of prefectural governments. Because private forest is basically private property, its management problems belong to the private sector, including forest owners. Prefectural governments require only information for the summary tables on forest resources. For prefectural staff, it is important to

¹⁰ In Kochi Prefecture the main objectives of a new regional tax are to promote public participation in forest improvement projects and related activities (Matsushita et al. 2004). Furukawa (2004) noted that the tax in Kochi includes various measures that reflect residents' intentions. An important characteristic of regional environmental taxes related to forests is that they represent a participative taxation system (Fujita 2008).

generate statistics that lack contradictory data, which can be accomplished by calculating all resource tables from the same database even if it contains incorrect data. In addition, forest owners have little incentive to report correct information to contribute to the completion of forest statistics. There are no penalties for forest owners who provide incorrect data.

The third point pertains to the use of forest resource statistics. Although the weaknesses in forest statistics, including the Forest Resource Database, are known, these shortcomings have not been made public. Forest statistics have traditionally been mainly used by forestry sector administrative offices. One of the reasons why forest statistics are not fully used may be that department staff recognize the severe limitations of these statistics. Given increasing forest usage the demand for forest statistics by sectors other than the forest sector will increase. Prefectural departments of forestry, which generate the forest statistics, will have to explain the current forest statistics. When a private company provides funds for forests to show their contribution in their annual environmental report, the prefectural government will need to provide correct maps and to make adequate calculations.

The poor use of forest statistics by sectors other than forestry is a result of the content of the statistics, which include incorrect data. Given that the use of these statistics is limited, the errors have not been corrected. Improvements will be needed if forestry statistics are to be open for international use. One such improvement will be to present important forestry statistics in English. It is also necessary to define more clearly the surveys and to conduct them more accurately to benefit users outside of the forestry sector. Both national and international users addressing the Kyoto Protocol will need such explanation and accuracy. Although the problems of domestic forestry and global warming prevention are basically different from one another, the reform of forestry statistics will greatly contribute to improvements in both areas.

The Role of Local Governments in Relation to the Kyoto Protocol and Private Forestry

Recently, policies regarding the promotion of decentralization and the consolidation of municipalities have been implemented in Japan. In the field of forestry, some authority on forest planning systems was transferred from prefectural governments to municipal offices in 1998. However, in most municipal offices, organization is poor and few staff deal with forestry. While prefectural governments include a forestry department, there is generally no department or section of forestry in municipal offices. Also, there are many engineering officials of forestry in prefectural governments, but few in municipal offices. Under these conditions, the role of prefectural governments remains important. The relationship between the national government and prefectural governments has been discussed in relation to the administrative decentralization for a long time. In February 2006, the Local Government System Research Council of the national government recommended the introduction of a new regional system instead of the current prefectural system.

The importance of prefectural governments is expected to increase in the future. As the policy objectives of the Kyoto Protocol are a national target, it is necessary to

strengthen the connection between the national government, which has accepted the legally binding treaty on an international basis, and the many municipal offices that have almost no special section on forestry. Under the current forest planning system, prefectural governments must develop a Regional Forest Plan, in which clear and feasible plans relating to the Kyoto Protocol are included.

Some private forest owners have abandoned their forest management roles completely, and even if greater subsidies were provided, many of them would not resume forest practices. To advance private forest policy related to the Kyoto Protocol, public sectors will ultimately have to care for a large area of private forest and will require an accurate and reliable forest resource management system. To keep forests under desirable management conditions, the roles of forest owners and their associations must be defined.

Conclusion

Under the Kyoto Protocol, forests subject to additional activities, including forest management and thinning since 1990, can be included in the calculation of the reduction of CO₂ emissions. Recently in Japan, timber production has been decreasing, silvicultural practices such as thinning have been decreasing, and management has ceased in some forests damaged by natural disasters. The national government recently began promoting forest management throughout the country to include as much forest as possible in the Kyoto Protocol calculation. However, the institutional basis necessary to identify the state of forest management and timber production is greatly lacking. An updateable and reliable forest resource database is lacking, no forest maps based on the National Land Survey exist, and national statistics on tree cutting are lacking. It is an arduous task for local governments to improve these basic data for the forest sector. A long-term perspective based on both national and regional actual forest conditions is needed. The major obstacles are political, such as the lack of commitment to change. These serious problems can be addressed through policies related to the Kyoto Protocol, contributing to the recovery of the domestic forestry sector.

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